

CLAIMS

1. A granular substance characterized by comprising:  
a matrix composed of a nonmagnetic insulating organic material; and  
ferromagnetic metal particles dispersed in said matrix and having a mean particle size of 50 nm or less;  
wherein the volume ratio of said matrix is in the range of 5 to 50%.
2. The granular substance according to claim 1, characterized in that said ferromagnetic metal particles are formed of a metal mainly comprising at least one element selected from Fe, Co and Ni.
3. The granular substance according to claim 1, characterized in that said ferromagnetic metal particles are formed of a metal mainly comprising Fe and Co.
4. The granular substance according to claim 3, characterized in that the concentration of Co in said metal mainly comprising Fe and Co is in the range of 10 to 50 at%.
5. The granular substance according to claim 1, characterized in that said ferromagnetic metal particles are spaced apart by a distance enabling exchange coupling therebetween.

6. The granular substance according to claim 1, characterized in that said matrix is formed of an organic polymer.

7. The granular substance according to claim 1, characterized in that the volume ratio of said matrix is in the range of 5 to 40%.

8. The granular substance according to claim 1, characterized in that said granular substance is in the form of a film, and has a complex permeability the real part ( $\mu'$ ) of which is 40 or more at 1 GHz, a quality factor  $Q$  ( $Q = \mu' / \mu''$  where  $\mu''$  is the imaginary part of the complex permeability) of 1 or more, and a saturation magnetization of 5 kG or more.

9. The granular substance according to claim 8, characterized in that the real part of the complex permeability ( $\mu'$ ) is 50 or more at 1 GHz.

10. The granular substance according to claim 8 or 9, characterized in that the quality factor  $Q$  ( $Q = \mu' / \mu''$  where  $\mu''$  is the imaginary part of the complex permeability) is 5 or more.

11. The granular substance according to claim 8 or 9, characterized in that the saturation magnetization is 6 kG or more.

12. The granular substance according to claim 1, characterized in that the resistivity is  $100 \mu\Omega\text{cm}$  or more.

13. A magnetic thin film having an in-plane magnetic anisotropy and having a thickness of 100 to 2000 nm, characterized in that:

said magnetic thin film is a mixture of ferromagnetic metal particles mainly comprising at least one element selected from Fe, Co and Ni and having a mean particle size of 50 nm or less and an organic polymer; and

in said mixture, said ferromagnetic metal particles are spaced apart by a distance enabling exchange coupling therebetween.

14. The magnetic thin film according to claim 13, characterized in that said ferromagnetic metal particles are formed of a metal mainly comprising Fe and Co.

15. The magnetic thin film according to claim 13, characterized in that the mean particle size of said ferromagnetic metal particles is in the range of 5 to 15 nm.

16. The magnetic thin film according to claim 13, characterized in that said organic polymer is a polyimide.

17. A magnetic device having a magnetic thin film for high frequency,

characterized in that said magnetic thin film for high frequency is formed of a granular substance comprising:

a matrix composed of a nonmagnetic insulating organic material; and

ferromagnetic metal particles dispersed in said matrix and having a mean particle size of 50 nm or less,

wherein the volume ratio of said matrix is in the range of 5 to 50%.

18. The magnetic device according to claim 17, characterized in that the mean particle size of said ferromagnetic metal particles is in the range of 5 to 30 nm.

19. The magnetic device according to claim 17, characterized in that said ferromagnetic metal particles are formed of a metal mainly comprising Fe and Co.

20. The magnetic device according to claim 17, characterized in that said matrix is formed of an organic polymer.

21. The magnetic device according to claim 20, characterized in that:

said organic polymer is a fluorocarbon polymer; and

the resistivity of said magnetic thin film for high frequency is 300  $\mu\Omega\text{cm}$  or more.

22. The magnetic device according to claim 17, characterized in that said magnetic thin film for high frequency has a complex permeability the real part ( $\mu'$ ) of which is 40 or more at 1 GHz, a quality factor Q ( $Q = \mu' / \mu''$  where  $\mu''$  is the imaginary part of the complex permeability) of 1 or more, and a saturation magnetization of 5 kG or more.